***Stage:*** **10.2**
**Analysis Stage**

***Responsibility:*** Project Team and System Owner

***Description:*** During the Analysis Stage, the Project File information, the Modification Request(s) validated in the Problem/Modification Identification Stage, and the system and project documentation are used to study the feasibility and scope of the modification, and to develop a preliminary Project Plan for design, test, and delivery.

If the documentation is not available or is insufficient and the source code is the only reliable representation of the software system, reverse engineering is recommended to ensure the overall integrity of the system. In those cases where long-lived systems have overgrown the initial base system and have poorly updated documentation, reverse engineering may be required and would evolve through the following steps:

For a smaller scope, or for local analysis on a unit level:

- Dissection of source code into formal units
- Semantic description of formal units and declaration of functional units
- Creation of input/output schematics of units

For a larger scope, or for global analysis on a system level:

- Declaration and semantic description of linear flows
- Declaration and semantic description of system applications (functions grouped)
- Creation of anatomy of the system (system architecture)

Modifications of a similar nature (i.e., affecting the same program(s)) should be grouped together whenever possible, and packaged into releases that are managed as projects. A release cycle should be established and published.

*Exhibit 10.2-1* (provided at the end of this section) summarizes the input, process, control, and output for the Analysis Stage.

***Input:*** Input to the Analysis Stage of software maintenance includes the following:

- Validated Modification Request
- Initial resource estimate and associated information
- Project and system documentation, if available

***Process:*** Preliminary analysis activities include the following:

- Make a preliminary estimate of the modification size/magnitude
- Assess the impact of the modification
- Assign the Modification Request to a block of modifications scheduled for implementation
- Coordinate the modifications with other ongoing maintenance tasks

Once modifications are agreed to, grouped if appropriate, and packaged, analysis progresses and includes the following:

- Define firm requirements for the modification
- Identify elements of the modification
- Identify safety and security issues
- Devise a test and implementation strategy

In identifying the elements of the modification (creating the preliminary modification list), examine all work products (e.g., software, specifications, data bases, and documentation) that are affected. Each work product is identified, and generated, if necessary, specifying the portion of the product to be modified, the interfaces affected, the user-noticeable changes expected, the relative degree and kind of experience required to make changes, and the estimated time to complete the modification.

The test strategy is based on input from the previous activity identifying the elements of modification. Requirements for at least three levels of testing, including individual unit tests, integration tests, and user-oriented functional tests are defined. Regression test requirements associated with each of these levels of testing are identified as well. The test cases to be used for testing to establish the test baseline are revalidated.

***Control:*** Control of the Analysis Stage activities includes the following:

- Retrieval of the relevant version of project and system documentation from the configuration control function of the organization.
- Review of the proposed changes and engineering analysis to assess technical and economic feasibility, and correctness.
- Identification of safety and security issues.
- Consideration of the integration of the proposed change within the existing software.
- Verification that all appropriate analysis and project documentation is updated and properly controlled.
- Verification that the test function of the organization is providing a strategy for testing the change(s), and that the change schedule can support the proposed test strategy.
- Review of resource estimates and schedules; verification of accuracy.
- Technical review to select the problem reports and proposed enhancements to be implemented in the new release.

***Work Products:*** The output of the Analysis Stage includes the following:

- Feasibility report for modification requests
- Detailed analysis report
- Updated requirements (including traceability list)
- Test strategy
- Project Plan

A written assessment, generally called a Feasibility Report, is prepared and contains the following:

- Short and long term costs
- The value of the benefit of making the modification (usually provided by the system owner)
- Solution approach, including prototyping if applicable

***Work Products, continued:***

- Safety and security implications
- Human factors

A project plan states how the design, implementation, testing, and delivery of the modification is to be accomplished with a minimal impact to current users.

***Review Processes:*** Conduct structured walkthrough(s), In-Stage Assessment(s), and a Stage Exit.

At the end of the Analysis Stage, a risk analysis is performed. Using the output of the Analysis Stage, the preliminary resource estimate is revised, and a decision is made on whether to proceed to the Design Stage.

**Exhibit 10.2-1. Analysis Stage**